

Application No. 09/735,941

Reply to Official Action mailed on May 19, 2004

Remarks/Arguments

Claims 1-33 remain in the application. Claims 1, 16, 18, 19, 20, 21, 29, 31, and 32 are amended. Claim 30 is cancelled.

Claim Rejections Under 35 USC § 102

Claims 1, 4, and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Garofalo et al. (United States Patent 6,633,590).

Claim 1 has been amended in order to define more clearly that subject matter which applicant regards as the invention. In particular, step a) has been amended to read:

“sending a plurality of packets, each packet being sent at a predetermined time and having a predetermined temporal spacing from other packets, from a time server to the client station via a communications network having unknown transmission time variations.”

An example of support for the above-mentioned proposed amendment to step a) may be found in the application as originally filed at paragraph [0058]. In addition, step f) has been amended to read:

“determining synchronization data in dependence upon round trip delay of the packets and in dependence upon variance in temporal spacing of received packets relative to the predetermined temporal spacing, the synchronization data relating to an estimate of a minimum travel time of a packet between the time server and the client station via a communications network having unknown transmission time variations that are significant relative to the minimum travel time.”

An example of support for the above-mentioned proposed amendment to step f) may be found in the application as originally filed at Figures 7d and 7f, and at paragraphs [0073] to [0075]. No new matter has been added.

Application No. 09/735,941

Reply to Official Action mailed on May 19, 2004

Applicant respectfully traverses the rejection of amended claim 1 as being anticipated by Garofalo et al. In particular, Garofalo et al. does not teach, either explicitly or impliedly, "determining synchronization data in dependence upon round trip delay of the packets and in dependence upon variance in temporal spacing of received packets relative to the predetermined temporal spacing, the synchronization data relating to an estimate of a minimum travel time of a packet between the time server and the client station via a communications network having unknown transmission time variations that are significant relative to the minimum travel time." In fact, Garofalo et al. relies upon a variation of the propagation delay being **insignificant** relative to propagation delay (see column 5, lines 56-62, for example). For instance, Garofalo et al. explicitly state that the advantage of their concept is that the effect of propagation variations in the ionosphere and the troposphere are eliminated. Since the effect of propagation variations is eliminated, the minimum travel time between a ground station and the satellite may readily be calculated as one half the total round trip delay. This is to be clearly distinguished from the instant invention as claimed at amended claim 1, in which variance in temporal spacing of received packets relative to the predetermined temporal spacing is used in the determination of synchronization data, the synchronization data relating to an estimate of a minimum travel time of a packet between the time server and the client station via a communications network having unknown transmission time variations that are significant relative to the minimum travel time.

Applicant respectfully submits that, for the above-mentioned reasons, amended claim 1 is in proper form for allowance. Favorable reconsideration is kindly requested.

Claims 4 and 6 both depend directly from believed allowable claim 1 and are also believed to be in proper form for allowance. Favorable reconsideration is kindly requested.

Claims 2, 3, 5, 21, 22, 24, 26, 28, and 29 are rejected 35 U.S.C. 103(a) as being unpatentable over Garofalo et al. (United States Patent 6,633,590) as applied to claims 1, 4 and 6 above, in view of Inukai (United States Patent 4,602,375).

Application No. 09/735,941

Reply to Official Action mailed on May 19, 2004

Applicant respectfully traverses the rejection of claim 2 as being unpatentable under 35 USC 103(a) over Garofalo et al. in view of Inukai. In particular, no combination of Garofalo et al. and Inukai teaches or suggests each and every feature of the instant invention in as complete detail as is claimed at claim 2. More specifically, Inukai teaches curve-fitting cumulative phase errors to a k-th order polynomial function, predicting clock drift in accordance with the polynomial function, and calculating an error correction value in accordance with the predicted clock drift (col. 10, lines 18-22). At column 15, lines 58-61, Inukai also teaches terminating a current correction interval and starting a next correction interval in the event the cumulative phase error exceeds one of the extreme values Y_{\min} and Y_{\max} . Garofalo et al. separately teaches synchronizing the frequency and the phase of an on-board clock of a satellite. No combination of Garofalo et al. and Inukai teaches:

determining synchronization data in dependence upon round trip delay of the packets and in dependence upon variance in temporal spacing of received packets relative to the predetermined temporal spacing, **the synchronization data relating to an estimate of a minimum travel time of a packet between the time server and the client station via a communications network having unknown transmission time variations that are significant relative to the minimum travel time; and,**

comparing the synchronization data to threshold values.

It is an unforeseen advantage of the instant invention as claimed at claim 2 that, by comparing the synchronization data (which relates to an estimate of a minimum travel time of a packet between the time server and the client station) to threshold values, it is possible to detect man-in-the-middle type attacks, or other types of delays which cause the minimum travel time of a packet between the time server and the client station to differ substantially from one half the round trip delay time. No combination of Garofalo et al. and Inukai achieves this same unforeseen advantage. In fact, both references teach line-of-sight propagation of signals through open space between a ground station and a satellite. In such a system, propagation delay variations in the two directions are insignificant such

Application No. 09/735,941

Reply to Official Action mailed on May 19, 2004

that the travel time of a packet between a ground station and a satellite is expected to be identical to the travel time in the reverse direction. Accordingly, Applicant respectfully submits that claim 2 is in proper form for allowance. Favorable reconsideration is kindly requested.

The same arguments that were presented with reference to claim 2 also apply to claim 3 *mutatis mutandis*. Accordingly, Applicant respectfully submits that claim 3 is in proper form for allowance. Favorable reconsideration is kindly requested.

Claim 5 depends indirectly from believed allowable claim 1 and is also believed to be in proper form for allowance. Favorable reconsideration is kindly requested.

Claim 21 has been amended in order to define more clearly that subject matter which applicant regards as the invention. In particular, step a) has been amended to read:

“sending a plurality of packets, each packet being sent at a predetermined time, from a first node to a second node via a communications network having unknown transmission time variations.”

An example of support for the above-mentioned proposed amendment to step a) may be found in the application as originally filed at paragraph [0058]. In addition, step f) has been amended to read:

“determining data in dependence upon round trip delay of the packets and variance in packet spacing and comparing the data to threshold values, the data relating to an estimate of a minimum travel time of a packet between the first node and the second node via a communications network having unknown transmission time variations that are significant relative to the minimum travel time.”

An example of support for the above-mentioned proposed amendment to step f) may be found in the application as originally filed at Figures 7d and 7f, and at paragraphs [0073] to [0075]. No new matter has been added.

Application No. 09/735,941

Reply to Official Action mailed on May 19, 2004

Applicant respectfully traverses the rejection of amended claim 21 as being unpatentable under 35 USC 103(a) over Garofalo et al. in view of Inukai. In particular, no combination of Garofalo et al. and Inukai teaches or suggests "determining synchronization data in dependence upon round trip delay of the packets and in dependence upon variance in temporal spacing of received packets relative to the predetermined temporal spacing, the synchronization data relating to an estimate of a minimum travel time of a packet between the time server and the client station via a communications network having unknown transmission time variations that are significant relative to the minimum travel time." In fact, Garofalo et al. relies upon a variation of the propagation delay being **insignificant** relative to propagation delay (see column 5, lines 56-62, for example). For instance, Garofalo et al. explicitly state that the advantage of their concept is that the effect of propagation variations in the ionosphere and the troposphere are eliminated. Since the effect of propagation variations is eliminated, the minimum travel time between a ground station and the satellite may readily be calculated as one half the total round trip delay. Similarly, Inukai teaches a system utilizing line-of-sight propagation of signals through open space between a ground station and a satellite. In such a system, propagation delay variations are insignificant and the travel time of a packet between a ground station and a satellite is expected to be identical to the travel time in the reverse direction. No combination of Garofalo et al. and Inukai teaches or suggests using variance in temporal spacing of received packets relative to the predetermined temporal spacing in the determination of synchronization data, the synchronization data relating to an estimate of a minimum travel time of a packet between the time server and the client station via a communications network having unknown transmission time variations that are significant relative to the minimum travel time.

Applicant respectfully submits that, for the above-mentioned reasons, amended claim 21 is in proper form for allowance. Favorable reconsideration is kindly requested.

The same arguments that were presented with reference to claim 2 also apply to claim 22 *mutatis mutandis*. Accordingly, Applicant respectfully submits that claim 22 is in proper form for allowance. Favorable reconsideration is kindly requested.

Application No. 09/735,941

Reply to Official Action mailed on May 19, 2004

The same arguments that were presented with reference to claim 2 also apply to claim 24 *mutatis mutandis*. Accordingly, Applicant respectfully submits that claim 24 is in proper form for allowance. Favorable reconsideration is kindly requested.

Claim 29 has been rewritten to include the limitation of objected to claim 30. Accordingly, amended claim 29 is believed to be in proper form for allowance. Favorable reconsideration is kindly requested.

Claim 30 has been cancelled.

Claim 31 has been rewritten in independent form including all of the limitations of the base claim. Accordingly, amended claim 31 is believed to be in proper form for allowance. Favorable reconsideration is kindly requested.

Claim 32 has been amended to depend from believed allowable amended claim 31 and is also believed to be in proper form for allowance. Applicant submits that amending claim 32 to depend from amended claim 31 provided correct antecedent basis for "authenticator" in the last line of claim 32. No new matter has been added.

Claim 33 depends from believed allowable claim 29 and is also believed to be in proper form for allowance. Favorable reconsideration is kindly requested.

Allowable Subject Matter

Applicant wishes to thank the Examiner for the indication of the allowability of claims 7-20, 23, 25, 27, and 30-33. Claim 30 has been cancelled.

Applicant looks forward to favourable reconsideration of the present application.

No new matter has been added.

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Application No. 09/735,941

Reply to Official Action mailed on May 19, 2004

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Respectfully submitted,

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